Comparing elastic materials: rubber and wire

Teacher / technician

YEAR 10 / LESSON 8 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Rubber measurements and staff wire demonstration are distinct datasets. Use an approved wire rig; a recorded fallback is not a substitute for completing practical experience.

Coverage and delivery

Shared Physics / Double Award: 1.22–1.24. Comparing force–extension behaviour and recovery.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, ten groups of three plus one staff demonstration

Item	Per pair / setup	Class total
Rubber-band rig with approved small loads	1 per group	10 sets
Timers	1 per group	10
Eye protection	1 per learner plus demonstrator	31
Booklet and graph paper	1 of each per learner	30 of each
Guarded copper-wire extension rig	Staff demonstration	1 set
Pre-prepared deformation photos	1 set per group	10 sets

Immediate safety

Wear eye protection. Use only approved loads on clamped rigs and keep faces away from tensioned materials. Check latex sensitivities before issuing rubber; provide a suitable alternative. The wire setup is staff-only behind a guard with padded catch trays. Do not touch, cut or break loaded wire.

Preparation and delivery

Read alongside the student method

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1. Prepare ten groups of three. Pilot the rubber type, five small loads and the ten-second reading interval. Supply sound bands and a non-latex alternative where required.

2. For the staff wire demonstration use the school's purpose-built guarded extension rig, a fresh copper specimen and a calibrated readout. Clamp it securely and place padded trays beneath hanging loads.

3. Choose a low reversible load range through a prior pilot; stop before yielding. Record the specimen, load range, gauge length and readout calibration. Do not improvise a hand-pulled wire or expose sharp ends.

4. If the approved wire rig is unavailable, use a recording of a measured demonstration and its labelled data, then arrange the practical experience separately. Do not describe video or practice data as pupil measurements.

5. Use existing photographs for permanent deformation; no deliberate failure test is included.

Close of lesson

• Unload gently; staff isolate and unload the wire rig before removal. Return sound bands and report damaged ones.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Yes; elastic recovery does not require Hooke's law.
- Rubber can continue changing length with time.
- Loading history affects the measured response; it need not mean permanent deformation.
- Compare unloaded dimensions before and after, allowing the stated recovery time.
- Its reversible extension may be smaller than a ruler division.
- No. Calibrate it or label the reading in arbitrary scale divisions.

References and provenance

Pearson Physics specification

IOP: stretching and force

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.